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SECRETARY OF THE AIR FORCE

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Civil Engineering

SNOW AND ICE CONTROL

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

OPR: HQ AFCESA/DMP
(CMSgt W. Wayne McGlothlin)
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(Col Donald J. Thomas, Sr)
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This instruction implements AFPD 32-10, *Air Force Installations.* It provides guidelines and procedures for the snow and ice control (S&IC) program. Major commands (MAJCOM) may supplement this instruction as necessary.

SUMMARY OF CHANGES

This instruction aligns with AFPD 32-10, superseding AFR 91-15. It updates, clarifies, and streamlines previous guidance on snow and ice control and more fully emphasizes environmental impact.

Chapter 1

KEY INSTRUCTIONS

1.1. Applying the Snow and Ice Control Program. Installations with over six inches average annual snowfall maintain a Snow and Ice Control Plan (S&ICP) and form a Snow and Ice Control Committee (S&ICC). Air Force stations and small units, such as surveillance sites and radar stations, will create plans to meet their specific needs.

1.2. Using Snow and Ice Control Core Principles. Start runway snow and ice control operations with the onset of snowfall or icing conditions to provide continuous bare pavement. The snow control center, command post, airfield management, and control tower must keep in close touch at all times.

1.3. Supporting the Mission. Maintain continuous mission capability by removing snow and ice from airfield and base pavements. Judge the success of the program by the safe movement of aircraft and vehicles in inclement winter weather.

1.4. Prioritizing Snow Removal. Establish priorities for clearing each installation using the following guidelines:

1.4.1. Priority 1:

- Primary runways and overruns.
- Primary runway access taxiways and alert facilities.
- Apron access taxiways.
- Aircraft crash fire equipment lanes.
- Access roads to special weapons, ammunition storage, refueling points, and other primary mission facilities.

1.4.2. Priority 2:

- Secondary runways, overruns, and taxiways.
- Aircraft parking aprons and remaining aircraft movement areas.
- Access roads to secondary mission facilities and primary base streets.

1.4.3. Priority 3. All other areas.

1.5. Using References and Resources. All S&IC activities that affect the environment must comply with AFPD 32-70, *Environmental Planning*. Tables of Allowance (TA) 008 and 012 help you determine the type and amount of equipment authorized for snow and ice control. You can get Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5200-30A, *Airport Winter Safety and Operations* and AC 150/5220-20, *Airport Snow and Ice Control Equipment* free from the FAA by writing the US Department of Transportation, General Services Section, M-443.2, Washington DC 20590. Installations that receive more than 36 inches average annual snowfall, as stated in the Surface Observation Climatic Summary maintained by the Base Weather Station (for entire reporting period), will earn a manpower variance for S&IC, reference Operations Flight AFMS 44EO. You can use this earned manpower to hire extra workers. Installations may use service contracts to augment their snow removal team, as approved by the BCE.

1.6. Creating the Snow and Ice Control Plan (S&ICP). The S&ICP follows the format of this instruction. The S&ICP may include procedures from this Instruction but tailor them to local needs. Attach snowfall history, equipment and attachment inventory, equipment plowing patterns, team composition, materials and parts levels, and color-coded maps. The Wing Commander gives final approval to the base S&ICP. Review the S&ICP annually and revise it as necessary.

1.7. Working With the Snow and Ice Control Committee (S&ICC). Chapter 2 lists the positions (except where noted) of representatives who comprise the S&ICC membership. Select additional representatives from major tenant organizations.

1.7.1. Hold at least two committee meetings each year. Conduct the pre-season meeting between 1 September and 15 October and the post-season meeting between 15 April and 31 May. The committee reviews:

- Snow removal priorities.
- Organization responsibilities.
- Problems during the previous seasons.
- Contract needs for emergency snow and ice control.
- Levels of spare parts, materials, and deicing chemicals.
- Manning and augmentee requirements.
- Status of snow equipment fleet.
- Off-season rebuild program.
- Annual depot repair needs.

1.7.2. The chairperson may form an internal S&ICC working group to coordinate details that don't require approval by the entire S&ICC.

Chapter 2

MANAGEMENT RESPONSIBILITIES

2.1. Committee Members and Exceptions. All the following individuals belong to the S&ICC membership except: Logistics Group Commander, Chief of Supply, Contracting Officer, Chief of Services, Chief of Safety, and the Communications Officer.

2.2. Assigning Responsibilities:

2.2.1. Wing Commander. Forms and chairs the S&ICC and appoints additional members as needed.

2.2.2. Support Group Commander. Activates the S&ICP when needed.

2.2.3. Base Civil Engineer:

- Coordinates installation snow and ice control activities.
- Requests a manpower variance when necessary.
- Approves requests for snow removal service contracts when justified.
- Evaluates the potential environmental impact when using runway deicing chemicals (paragraph 4.2).
- Provides storm water management to minimize potential impact.
- Approves S&IC equipment for multiple uses (paragraph 4.3.5) and ensures new construction complies with paragraph 3.5.

2.2.3.1. Operations Flight Chief:

- Provides adequate facilities, equipment, materials, and trained personnel for the snow and ice control program.
- Prepares the S&ICP.

2.2.3.2. Chief of Heavy Repair:

- Prepares for, performs, and follows-up S&IC activities.
- Complies with the instructions found in chapters 3, 4, and 5.
- Plans the S&ICC meetings and publishes minutes.

2.2.4. Operations Group Commander:

- Sets snow removal priorities for flying operations.
- Provides timely weather information for snow and ice control operations.

2.2.4.1. Chief of Command Post:

- Develops aircraft parking plans to use during snow and ice control operations.
- Directs maintenance activities to:
- Clear all removable items that are not in use, such as tools, fire extinguishers, wheel chocks, and aerospace ground equipment from parking ramps to a designated area.
- Clear snow from around ramp telephones or other permanently installed flight line equipment in the vicinity of the aircraft.

- Remove aircraft from areas to be cleared, when feasible.

2.2.4.2. Chief of Airfield Management:

- Gives priority to S&IC to allow aircraft operations to continue.
- Conducts periodic runway friction readings according to Technical Order 33-1-23, *Procedures for Use of Decelerometer To Measure runway Slickness*, when there is snow, ice, or slush on the airfield.
- Publishes orders and instructions concerning:
- Flight line licensing for snow removal equipment operators.
- Vehicular traffic and communication procedures for airfield areas.
- Minimum runway condition readings for departure and arrival of particular aircraft.

2.2.4.3. Chief of Weather Operations:

- Notifies the Snow Control Center (SCC) when forecasts predict snow or ice accumulation.
- Notifies the SCC of significant changes to a previous forecast.
- Provides information on request by the SCC or BCE.
- Provides necessary data for pavement temperature forecasts at installations where runway ice detection systems operate.

2.2.5. Logistics Group Commander. Provides snow and ice control services.

2.2.5.1. Chief of Transportation:

- Develops and runs a post-season rehabilitation program for snow and ice control equipment.
- Sets up and runs a maintenance and repair program for all snow and ice control vehicles. The program includes immediate repair of all breakdowns that occur during actual snow removal. Coordinates the start and end dates for this priority response with civil engineering.
- Establishes minimum stock levels of vehicle parts for snow and ice control vehicles.

2.2.5.2. Chief of Supply:

- Promptly procures requested equipment and supplies for snow and ice control.
- Provides minimum levels of spare parts for snow and ice control equipment.
- Provides around-the-clock refueling for snow and ice control equipment during actual snow and ice control operations.
- Provides fuel trucks to refuel equipment on-site when the base fuel pumps are not near the operations.

2.2.6. Chief of Security Police:

- Enforces BCE restricted parking notices during snow and ice control operations.
- Removes portable restricted area boundaries to allow efficient plowing.
- Sets up entry control procedures for snow removal personnel and equipment entering "restricted" areas.

2.2.7. Contracting Officer:

- Administers contracts for emergency equipment rental or repair.
- Promptly procures parts and supplies for snow and ice control operations.
- Sets up emergency procurement procedures for abnormal duty hours.

2.2.8. Chief of Services. Provides box meals for S&IC personnel whose duty hours or locations prevent their eating in the dining facilities.

2.2.9. Chief of Safety:

- Reviews the S&ICP to make sure that planned operations are safe (according to paragraph 3.1.2).
- Publicizes snow and ice hazard information and the precautions to take when encountering snow and ice control equipment.

2.2.10. Communications Officer:

- Provides land mobile radio (LMR) communications for S&IC operations.
- Reviews requests for LMR equipment according to AFI 33-106, *High Frequency and Land Mobile Radio Managemen*t (formerly AFRs 700-17 and 700-18).
- Passes runway vehicle clearance control to the snow supervisor when requested during operations.
- Repairs LMRs for S&IC operations using established priority repair lists in unit or base directives.

Chapter 3

SNOW AND ICE CONTROL PREPARATIONS

3.1. Readying the Snow Team:

3.1.1. Training. Give higher priority to training after winters with below-average snowfall. Include:

- Formal classroom lectures, training films, and discussion periods.
- Hands-on training for all snow and ice control equipment. Perform practice runs with the equipment using typical operation scenarios. Substitute water for liquid deicers to reproduce realistic operations.
- Tabletop exercises using miniature equipment on airdrome layouts to simulate operations and to reduce training costs.
- Operator maintenance responsibilities, including fuel, fluid ,supply locations, repair techniques, and Heavy Equipment Maintenance reporting procedures.
- Communication procedures and right-of-way information.
- Details of the S&ICP, emphasizing the order of priorities.
- An airfield and base familiarization tour highlighting locations where problems are likely. Conduct a night tour for night shift employees.
- Duty location, duty hours, duty uniform, shift schedules, and notification procedures.
- Periodic attendance at technology sharing seminars and workshops with other military bases and governmental agencies.

3.1.2. Safety and Health:

3.1.2.1. Units must comply with all vehicle licensing, personal protective equipment, and medical requirement policies. All equipment operators, military or civilian, must meet minimum training hour requirements before licensing. Employ overhires early enough to leave time for their training and medical examinations.

3.1.2.2. S&IC operations and working conditions are hazardous. Anticipate damage to snow equipment and attachments because of hidden obstructions. Emphasize safety and make sure that all operators wear safety restraints.

3.2. Readying the Snow Equipment. All equipment must be mechanically sound and operational by 1 September. Equipment status must be available for the pre-season meeting. Use heated storage to lengthen the equipment life, reduce maintenance costs, and ensure rapid response.

3.2.1. Procedures:

- Perform preseason operational checks including dry runs that closely resemble winter use as closely as possible.
- Install and inspect radios early.
- Begin daily run-up and operational checks when the temperature drops below freezing.
- Adjust and calibrate all S&IC equipment attachments precisely. Load ballast and install tire chains prior to S&IC operations.

- Equip each unit with required support materials such as tow cables, shovels, shear pins, ice scrapers, and tool kits as required.
- Use wear-resistant tungsten carbide cutting edges to reduce maintenance.
- Replenish broom cores with steel or poly bristles or a combination of both. Loss of steel bristles increases FOD potential, so minimize loss by trying various brands and storing the snow brooms indoors.
- Put vehicle call signs, base and airfield maps, spreader settings, operator's manuals, and snow removal priorities in the vehicle for the operator's convenience.

3.3. Obtaining Materials and Parts. The Chief of Heavy Repair procures adequate stocks of S&IC supplies by 15 September each year. Establish minimum levels for each item, arrange for on-call items, and identify shortages by 31 May each year.

3.4. Protecting US Air Force Property. The Chief of Heavy Repair specifies "safety zones" around key assets and includes this information in the S&ICP. Snow removal vehicles will not operate within these safety zones.

3.4.1. Infrastructure. Heavy repair crews mark all obstructions that could damage snow equipment. The marking crew emphasizes drainage culverts, catch basins, manhole covers, fire hydrants, and drop-offs during pre-season inspections.

3.4.2. Airfield Lighting. You may use non-metal markers to identify taxiway lights. Federal Aviation Administration Advisory Circular 150/5345-1U provides the name and address of marker manufacturers. If you experience excessive damage to in-pavement taxi lights, consider purchasing "snowplow resistant" lighting.

3.4.3. Facilities. S&IC equipment operators maintain sufficient clearance around facilities to prevent damage. Operators must observe the safety zone.

3.5. Streamlining Operations. Civil engineering personnel should guard against snow removal constraints. Excessive bumper blocks, elevated utility manholes in pavements, congested or enclosed parking arrangements, lack of road shoulders, and dead-end or cul-de-sac streets severely hamper operations. Minimize these adverse conditions through better communications. Construction management personnel should coordinate maintainability checklists and drawings for upcoming projects with maintenance personnel.

3.6. Reviewing Runway Ice Detection Systems (RIDS):

3.6.1. Using Sensors. Sensors embedded in the pavement measure surface conditions. They precisely measure the pavement temperature, indicate the presence of water or ice, and provide information to choose the most appropriate S&IC strategy.

3.6.2. Influencing Factors. Many factors influence the formation of ice on pavements, including pavement temperature, surface color and composition, wind, humidity, solar radiation, traffic, and residual deicing chemicals. Air temperature is not an accurate gauge of pavement surface conditions. Knowing the direction and rate of change of pavement temperature lets you predict ice formation. Sensors are particularly valuable in timing anti-icing applications of chemicals. When ice or com-

pacted snow accumulates on pavements, knowing the pavement temperature helps you choose the right chemicals and know how much to use to get the most effect with the least amount of material.

3.6.3. Preseason Checking. Check systems before the season starts to make sure that routine maintenance was done and that systems work. Replace all required filters and clean the sensor pins.

3.7. Establishing the Snow Control Center (SCC). The snow control center is a focal point for all S&IC activities. Equip the SCC with:

- At least two class "A" telephone extensions for recalling off-base personnel.
- One radio transceiver or remote. Use a dedicated net for snow removal communications when possible.
- Dispatch boards displaying vehicle registration numbers, nomenclature, vehicle status, dispatched location, operator, radio call sign, and comments.
- Appropriate layout maps with color-coded priorities, status, and runway surface conditions.
- Required publications including this Instruction and the S&ICP.
- Personnel rosters showing duty status and recall information.
- Charts identifying current weather conditions and the forecast.
- Alternate sources of equipment and personnel to support contingencies. Include instructions for renting equipment, or DoD mutual support agreements with regional active or reserve units.

Chapter 4

SNOW AND ICE CONTROL OPERATIONS

4.1. Removing Snow From the Airfield. The severity of the snowstorm determines the size of the area on which you focus. Follow these basic guidelines:

- Reduce operations and concentrate on keeping the center of the runway and taxiways open when snow accumulation prevents clearing an entire area.
- Use snow plows in tandem to move snow into a windrow that is cast over the edge lights by a snow blower. Include the overruns with the runway plow patterns.
- Clear enough area to leave room for wings and engines. Determine permissible snow depth beyond the shoulders for the most demanding aircraft at the base.
- Glide slope critical areas require specific snow depths to prevent signal loss. Reduce the profile height to help in future operations. Keep runway and taxiway lights uncovered.

4.1.1. Maintaining Communications. All snow removal units operating in the aircraft movement area must maintain radio contact with the control tower, or be under the control of a supervisor with control tower communications. Work out in advance ways of communicating with base operations when the radio signal is lost. You may need to install radios equipped with headsets to offset the high noise levels generated by snow removal equipment. Requests to clear the runway must allow enough time for the snow team supervisor to physically check the entire runway.

4.1.2. Determining Right-of-Way. Snow removal techniques are necessarily high speed and can't always comply with airfield speed limits. Control tower personnel, other vehicle operators, and aircraft ground maintenance personnel should understand this and yield to snow and ice control equipment.

4.1.3. Following General Procedures. While conditions at individual bases vary widely and may require special S&IC techniques and equipment, follow general procedures as closely as possible. Wind speed and direction will determine your actual clearing pattern. For normal operations:

- Start at the center of the runway and work outward to the shoulders.
- Use snow brooms throughout the snowfall to keep the middle of the runway down to bare pavement, regardless of the rate of snowfall.
- Broaden snow removal efforts to include the entire primary runway during light-to-moderate snowfall. Use displacement plows and snow blowers to remove the windrows accumulated by the sweepers.
- Concentrate all effort on keeping the center portion of the runway open during heavy snowfall.

4.1.3.1. Managing Vehicle Flow. Keep a safe distance between vehicles operating in a snow removal pattern to avoid accidents due to loss of view.

- Time equipment movements for orderly turnaround and safe reentry at the start of the next pass.
- Reduce unrelated radio traffic on the snow control frequency during runway snow removal operations. Snow removal transmissions must have priority on a multiple-user net.

4.1.3.2. Operating During Calm and Parallel Wind Conditions. Snow removal starts at the end of the runway, to one side of the centerline, and works toward the shoulders. When the windrows of snow from the sweeping operation become too heavy, use a displacement snow plow to continue the windrow.

4.1.3.3. Operating During Crosswind Conditions:

- Start clearing the snow from the upwind side of the runway.
- Let the wind help you move the snow across the runway if time and aircraft operations permit. After you begin the clearing pattern, continue it for the entire width of the runway to avoid obscuring the runway centerline or leaving a windrow on the runway.
- Advise the tower and airfield management before beginning cross-wind snow removal.
- Call the control tower's attention to hazards such as windrows, snow banks, slush, and so on if you must stop clearing operations before finishing the entire runway width.

4.1.3.4. Clearing Runway Edge Lights. Keep runway edge lights clear to give runway clearance for aircraft movements. Use the air blast from the rotary snow broom to clear runway lights of dry snow. You may use detail personnel to keep lights uncovered.

4.1.3.5. Removing Snow From Semiflush, In-pavement Lights. Be careful when operating a snow plow over these lights. Adjust steel blades to clear the top of the lights. When possible, use snow plows equipped with polymer or rubber blades or a snow broom. Polymer blades may reduce collateral damage, but aren't economical for all plowing conditions.

4.1.3.6. Clearing Snow From the Aircraft Arresting Systems (AAS) Area. Before you begin clearing the snow, deactivate aircraft arresting systems and remove the pendant and barrier. Remove enough snow to allow full use of the AAS. Include specific techniques in the S&ICP. Use portable snowblowing equipment and manual labor around AAS. Use AAS maintenance or augmentee personnel for this work.

4.1.3.7. Clearing Snow From the NAVAIDs Area. Include specific procedures in the S&ICP for snow removal around navigational aids.

4.1.3.8. Clearing Other Airfield Areas. The facility occupant, manager, or office of primary responsibility oversees snow removal that requires hand shoveling, small rotary blowers, or small tractor-mounted plows. This includes removing snow from areas around aircraft hangars and shelters, grounding points, parked aircraft (within the defined safety zone), navigation aids, arresting system building, and other areas that you cannot safely clear using snow removal equipment. Clear snow from the face of all signs.

4.1.4. Disposing of Bulk Snow. Haul snow to a disposal site if there is not enough storage space near the areas being cleared. Before winter arrives, choose a readily accessible site where the snow pile will not interfere with aircraft operations. Coordinate with environmental and other appropriate base agencies when planning disposal sites. Avoid excessive chemical loading of nearby drainage areas.

4.1.5. Creating Temporary Airfield Markings. Use locally purchased sea dye (yellow-orange) to mark runway and taxiway guidelines, hazardous temporary windrows, or banks that you cannot immediately remove. The airfield manager or flight safety office should tell you where to put the markings.

4.2. Removing and Controlling Ice on the Airfield. Icy pavements are dangerous and jeopardize the mission of the base. The BCE will select specific individuals in the S&IC chain of command to make airfield pavement deicing decisions. Select individuals based on duty position, experience, and environmental awareness. Base the decision to use ice control chemicals on the weather forecast, flying schedule, and environmental considerations. The Snow Control Center should carefully monitor both use and issue of ice control chemicals and log the quantities and locations used. Compile season-end figures for reporting to the MAJCOM.

4.2.1. Knowing How Ice Forms. Snow and ice control teams must know the various conditions that cause ice to form. Freezing rain, frozen water vapor and fog, freezing surface water, compacted snow, and the thawing and refreezing of snow all may lead to hazardous pavement surfaces. Don't use chemicals during the early stages of dry snowfall or while snow is blowing since the melting ability of these chemicals may actually increase ice formation.

4.2.2. Controlling Ice Mechanically. Using RIDS, anti-icing methods, and the "bare pavement" concept for the runway should minimize ice accumulation. When ice forms:

- Use underbody scrapers or graders to scrape the ice to less than 1/8 inch before using deicing chemicals.
- Remove slush or soft ice with rubber cutting edges.
- Use serrated cutting edges to cut longitudinal grooves in hard ice to help hold chemicals and improve traffic control.
- Use caution with rotary snow brooms on hard packed snow and ice. In some cases, the snow broom may glaze or "polish" the ice and further reduce traction. Steel snow broom bristles help cut ice; poly bristles are best for "flipping" snow.

4.2.3. Using Ice Control Chemicals. Use only chemical anti-icing and deicing agents authorized for airfield pavements by the Air Force Materials Laboratory at Wright-Patterson AFB OH.

4.2.3.1. Urea. Shotted or prilled urea meeting MIL SPEC DOD-U-10866D or SAE AMS 1431A performs well down to 15 degrees Fahrenheit. Carefully monitor urea use since its overuse can lead to environmental degradation. See table 4.1 for application rates.

Table 4.1. Urea--Pounds Per 1,000 Square Feet.

	Pavement Temperature		
Ice Thickness	**30×F (-1.1×C)**	**25×F (-3.9×C)**	**20×F (-6.7×C)**
Less than 1/32"	16	23	60
1/32" to 1/8"	30	60	125
1/8" to 1/4"	125	175	275

4.2.3.2. Isopropyl Alcohol. You can use grade B isopropyl alcohol meeting Federal Specification TT-I-735a as an anti-icing and deicing agent. The Chief of Heavy Repair evaluates storage and handling concerns before purchasing isopropyl alcohol.

4.2.3.3. Propylene Glycol. You can use propylene glycol meeting SAE AMS 1426B as an anti-icing and deicing agent. Sixty-percent solution of propylene glycol has a freezing temperature of about -75×F. Applying propylene glycol may initially degrade pavement friction slightly,

but the frictional quality of the pavement surface should recover quickly if the pavement's micro texture is sound. You may not buy ethylene glycol-based products to deice pavements.

4.2.3.4. Potassium Acetate. Potassium acetate deicers are currently the most environmentally acceptable agents. You can use potassium acetate liquid chemicals meeting specification SAE AMS 1432. Table 4.2 shows application rates.

Table 4.2. Potassium Acetate--Gallons Per 1,000 Square Feet (See Note).

	Pavement Temperature		
Ice Thickness	**20×F to 32×F**	**10×F to 19×F**	**Less than 10×F**
Less than 1/32"	.9	1.2	1.8
1/32" to 1/8"	1.2	1.8	3.0
1/8" to 1/4"	1.8	2.7	6.0

NOTE:

When freezing conditions are expected to occur, you can use potassium acetate as an anti-icer at the rate of .4 gallons/1,000 square feet.

4.2.3.5. Ethylene Glycol. Ethylene glycol will not be used for any deicing activities because of its highly toxic nature.

4.2.4. Storing Ice Control Chemicals. Store ice control agents in enclosed shelters when possible. Properly storing deicing and anti-icing chemicals reduces environmentally-caused product degradation. Storing abrasives under shelter prevents moisture absorption that may freeze the stockpile in cold weather. Liquid ice control chemicals stored in tanks must comply with AFI 32-7080, *Pollution Prevention Programs* (formerly AFR 19-15). Store potassium acetate chemicals in polyethylene or stainless steel tanks.

4.2.5. Impacting the Environment. Use ice control chemicals responsibly to minimize environmental impact.

4.2.5.1. If available, use runway ice detection systems so teams can use anti-icing techniques rather than deicing.

4.2.5.2. Minimize your use of glycols and urea, and rely on safer alternatives, such as potassium acetate. Excessive glycol and urea use has degraded waterways in some locations.

4.2.5.3. Some deicers may cause light scaling of Portland cement concrete (PCC) by physical action related to the chemical concentration gradient in the pavement. Don't apply ice control chemicals to new Portland cement concrete pavements for the first year.

4.2.6. Dispensing Deicing and Anti-icing Chemicals:

4.2.6.1. Solid Chemicals:

- Use any suitable dispenser. For uniform coverage on the airfield, you will need between 5 and 7 cubic yard material spreaders that can accurately dispense chemicals. The dispenser must be able to apply a uniform pattern at various density settings.
- Use waterproof coverings to prevent the chemical from absorbing moisture.

- Use solid chemical dispensers with pre-wetting capability when possible. Pre-wetting solid deicers with approved liquid deicers is much more effective at low temperatures and prevents the solid deicers from being blown away by high winds.

4.2.6.2. Liquid Chemicals. You can use trucks equipped with tanks and spray bars to dispense liquid chemicals. The spray bar and nozzles should cover well without excessive runoff. You can also use portable towed tanks and water distributors but these will require flushing if used for multiple activities.

4.2.7. Anti-Icing Procedures. Whenever possible, snow and ice control teams should emphasize anti-icing rather than deicing especially those installations that have runway ice detection systems. Direct the primary ice control efforts at keeping ice from bonding to pavements. Anti-icing requires applying liquid deicing chemicals just before freezing conditions occur. Chemicals in liquid form are most effective for anti-icing. If you apply a dry, solid chemical to a cold, dry surface, it won't stick, and surface winds or aircraft may scatter it.

4.2.8. Deicing. Deicing may require up to five times as much chemical as anti-icing. Apply the deicer and wait long enough for it to take effect, then remove it with rotary snow brooms or snow plows.

4.2.9. Using Abrasives. Use abrasives only in emergency conditions to improve traction on airfield surfaces. Use only FAA-grade sand that is clean, free running, and contains no loam or clay. 100 percent should pass a No. 4 sieve and not more than 30 percent pass a No. 5 sieve. Heating the abrasive before applying it helps it stick to the ice.

4.2.10. Grooving Pavement. Cut grooves into the pavement to trap deicing chemical, reduce loss, and prolong the melting action. Grooves also help drain melt water and reducing refreezing.

4.2.11. Considering Porous Friction Surfaces (PFS). Base any decision to install PFS pavement on benefits unrelated to S&IC. PFS pavements retain more snow and ice and need more chemicals than do dense graded asphalt pavements. PFS pavements also affect S&IC operations since steel cutting edges may cause PFS pavements to lose aggregate. Carefully evaluate any use of steel plow and underbody cutting edges where PFS pavement exist.

4.3. Controlling Snow and Ice on Roadways, Parking Lots, Housing, and Other Areas. Remove snow from these areas to allow normal base activity to proceed with minimum delay. When possible, work during non-peak hours to avoid congestion.

4.3.1. Clearing Roads and Streets. Plow from the center of the road, pushing the windrow to the shoulder. In heavy accumulation regions, use rotary snow blowers to clear shoulders and sidewalks.

4.3.2. Clearing Parking Lots. The Chief of Heavy Repair, Security Police, and Facility Managers decide when parking lots will close for snow removal. If required, the S&ICP should address the need for temporary parking areas. Use local media to publicize parking arrangements.

4.3.3. Clearing Housing and Other Areas. The S&ICP will specify the snow removal responsibilities of the occupant and facility manager for sidewalks, entrances, fire hydrants, and loading ramps.

4.3.4. Removing and Controlling Ice:

4.3.4.1. Using Chlorides. Store chlorides properly to prevent contamination. As with all deicers, use as little as possible. Environmental contamination is most likely at storage sites. Keep chloride deicers dry to prevent ground or surface water contamination. Use chlorides as follows:

- Use sodium chloride (rock salt) and calcium chloride to deice non-airdrome areas. Because they are corrosive, use them away from aircraft movement areas.
- Use sodium chloride (with or without added liquid calcium chloride) to deice base areas. It is cheap and effective.
- Use calcium chloride instead of sodium chloride at lower temperatures. Pre-wetting makes it even more effective. You may use chloride-based deicers with corrosion inhibitors on bridges or other structures.

4.3.4.2. Using Abrasives. Use sand, cinders, and fly ash to increase vehicle traction. You can add between 5 and 15 percent chloride to sand to improve traction and help melt ice. Although abrasives may improve traction on icy pavements, heavy applications can insulate the ice and keep it from melting. It may degrade air quality in windy locations and lead to drainage problems. Routinely clear drainage inlets in order to avoid flooding when the ice and snow melts.

4.3.5. Using Snow Removal Equipment:

4.3.5.1. On the Base. Use dump trucks with reversible plows, road graders, loaders with buckets or plows, deicing chemical dispensers, and attachments to other equipment. Use caution in assigning any airfield equipment to base streets. Assign rollovers and towed snow brooms to base areas only in emergencies. Supervise them closely and use them only during low traffic periods.

4.3.5.2. Other Uses. Ideally, you will use snow and ice control equipment only for snow and ice removal. However, the Base Civil Engineer may authorize using snow removal equipment for non-S&IC activities, such as snow brooms for runway rubber removal operations, as long as you take normal precautions and the operation does not damage the snow removal equipment.

Chapter 5

POST-SEASON ACTIONS

5.1. Implementing Lessons Learned. The BCE Operations Flight Chief reviews the activity logs at the end of the snow season, determines the problems and successes, and incorporates improvements into the revision of the S&ICP. Begin preparing for the next snow removal season at the end of the current season.

5.2. Reconditioning Snow Removal Equipment. The Chief of Heavy Repair, or his designee, thoroughly inspects, repairs, and stores all snow and ice control equipment as soon as possible. Identify all required replacement parts and order them immediately. The Vehicle Control Officer or NCO will brief the staff on the status of snow removal equipment at commander's update briefings.

5.3. Repairing Real Property. Complete normal end-of-season activities such as storing snow fences and snow markers. Inspect all pavement surfaces for damage caused by snow removal equipment. Survey other property for possible damage, such as airfield lighting, aircraft arresting systems, base signs, grounds, and security fences. Schedule repairs based on local priorities.

JAMES E. McCARTHY, Maj General, USAF
The Civil Engineer